

In re Appl. No. 09/144,851  
Confirmation No. 5275

**REMARKS**

Claims 21-24 and 27-31 currently appear in this application. The Office Action of October 11, 2001, has been carefully studied. It is believed that all of the claims are allowable, and favorable action is earnestly requested.

Nevertheless, in deference to the Examiner's views and to avoid or minimize needless argument, a number of cosmetic amendments have been made by rewriting the claims in order to place the claims into better form consistent with U.S. practice. The amendments are not "narrowing" amendments and are not made for any "substantial reason related to patentability." The scope of the claims has not been changed; no limitations have been added and none are intended.

**Election/Restriction**

Claims 1-20 were canceled in the amendment filed June 20, 2001.

**Rejections under 35 U.S.C. 112**

Claim 31 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

This rejection is respectfully traversed. Claim 31

In re Appl. No. 09/144,851  
Confirmation No. 5275

has now been amended to recite that the fruit vinegar is subjected to ultra filtration. It is well known to those skilled in the art that mass production of draft beer <sup>✓</sup> uses microfiltration rather than heat to sterilize the beer. As can be seen from Figure 1 in a partial copy of *Food Production/Distribution Data Book*, the pore size of an ultrafiltration membrane is smaller than that of a microfiltration membrane. Further, it is understood that an ultrafiltration membrane can substantially remove most viruses as well as bacteria. However, rather than quibble about what happens during the process, claim 29 has been amended to recite that the fruit vinegar is subjected to ultrafiltration.

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All references to "or a mixture of plural members" have been deleted.

Claims 21-31 are rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

This rejection is respectfully traversed. Claim 21 has now been amended to delete the indefinite language.

Claim 29 has been amended to recite that the additional juice is added at the latter half of the fermentation. Support for this amendment can be found in the specification as filed at page 9, lines 7-9.

**Art Rejections**

Claims 21-30 are rejected as being unpatentable over Seike in view of Jackson.

This rejection is respectfully traversed. It has been found that a low pH, e.g., less than 2.5, damages the activity of acetic acid bacteria. Flavorful citrus fruit juices such as shoe in the present invention, i.e., lemon juice, lime juice, yuzu juice, etc., which contain a large amount of citric acid, have a low pH. The present specification describes this on page 3, line 13 to page 4, line 2 as follows:

"As the results of intensive examinations of the properties of citric acid, attention has been focused on the fact that the pH per acidity is lower in citric acid than in acetic acid. Actually, it was confirmed that when the concentration of citric acid was elevated in fruit juice, the pH was rapidly lowered; it was confirmed, for example, that the pH of 30 mg/ml citric acid was lowered to or below 2.4. If a fruit juice containing much citric acid is used for "moromi", **the activity of acetic acid bacteria is damaged owing to lowering of the pH** of the "moromi."

Therefore, fruit juice not containing so much citric acid, such as apple juice or grape juice, can be readily subjected to acetic acid fermentation, so that apple vinegar and grape (wine) vinegar can be prepared."

The object of the present invention is to provide a method for producing a vinegar from a citrus fruit juice which has a good flavor (the flavorful acid citrus fruit juice,

In re Appl. No. 09/144,851  
Confirmation No. 5275

e.g., lemon juice, lime juice, yuzu juice, etc.). The citrus fruit juice in the present invention usually has a high content of citric acid. The activity of acetic acid bacteria is inhibited because of the very low pH of these juices, which low pH is caused by the high content of citric acid.

Therefore, in order to produce a juice having a higher pH value (3.0 or more) for acetic acid fermentation, the present inventors have produced fruit vinegars by using a juice having a naturally low citric acid content or a juice in which the citric acid content is lowered by removing the citric acid. Thus, it is now possible to produce a vinegar from citrus fruit juice.

The citric acid content in the juice is reduced so as to elevate the pH of the juice, namely, in order to convert the citrus fruit juice which has a high concentration of citric acid to a juice which can be used for acetic acid fermentation.

Submitted herewith is a certified English translation of Seike. It can be seen from this translation that Seike teaches regulation of the acidity of citrus fruit juice by elevating the pH to 4.6 by adding sodium citrate. However, addition of sodium citrate produces a vinegar with a bad flavor, as described in the present specification as filed at page 4, lines 8-16. \*

Seike discloses the use of Satsuma mandarin juice, which has much less citric acid than the citrus fruit juice in the present invention. For example, the citric acid content of lemon juice is six times that of Satsuma mandarin juice, as can be seen from the English translation of *Newest Cyclopedia of Fruit Juice and Fruit Drink*, a copy of which is submitted herewith. Using sodium citrate to raise the pH of lemon juice to 4.6 requires much more sodium citrate than for raising the pH of Satsuma mandarin juice, thereby leading to a remarkably bad taste for the lemon juice vinegar.

Although Jackson teaches adjusting the acidity or pH in wine production, Jackson's teaching is to modify the taste of wine made from grape juice. Fermenting grape juice to make wine, i.e., fermenting the sugars to ethanol, has nothing to do with acetic acid fermentation, which is a step beyond ethanol fermentation. There is nothing in Jackson that would lead one skilled in the art to raise the pH of juice for acetic acid fermentation, since Jackson is only concerned with producing ethanol, not acetic acid. These are two quite different steps and produce two quite different products, wine being substantially different from wine vinegar.

Castillon et al. add nothing to Jackson or Seike, as Castillon et al. merely teach that ultrafiltration membranes are commonly used to purify vinegar. There is nothing at all

In re Appl. No. 09/144,851  
Confirmation No. 5275

in Castillon et al. that teaches or suggests that vinegar can be produced from citrus fruit juices by lowering concentration of citric acid in the juices.

The present invention is not a new recipe or formula for cooking food in which one ingredient has been omitted. The present inventors have discovered that citric acid interferes with acetic acid fermentation, and that removal of citric acid from juices high in citric acid makes it possible to produce vinegars from citrus fruit juices.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,  
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21. (Third Amendment) A method for producing a fruit vinegar comprising subjecting to acetic acid fermentation by acetic acid bacteria in the presence of ethanol one member selected from the group consisting of (a) and (b), wherein

(a) is ~~at least one~~a member selected from the group consisting of lemon juice, lime juice, yuzu juice, kabosu juice, sudachi juice, and shii kuwasa juice, wherein said ~~at least one member represents one member or a mixture of plural members and has a pH value of 3.0 or more; wherein said at least one~~ member is

(1) juice having naturally ~~said a~~a pH value of 3.0 or more;

(2) juice having ~~said a~~a pH value of 3.0 or more adjusted, not by addition of an agent to neutralize citric acid but by reducing citric acid content by from 50 to 100% by weight, or

(3) a mixture of (1) and (2); and

(b) a dilution of (a);

wherein the reducing of citric acid content in (2) has been effected by

(i) adding calcium carbonate to the ~~non-yet-pH-~~  
~~adjusted, one member or mixture of plural members or each of~~  
~~the plural members before preparing the mixture of plural~~

~~members, and removing precipitated calcium citrate~~

~~therefrom~~member to precipitate calcium citrate and removing  
the calcium citrate or

(ii) contacting ~~resin with the non yet pH-adjusted, one~~  
~~members or mixture of plural members or each of the plural~~  
~~members before preparing the mixture of plural members, thereby~~  
~~removing~~the member with an anion exchange member to remove citric  
acid therefrom.

29. (Amended) The method according to claim 21 wherein  
~~at least~~ one member selected from the group consisting of lemon  
juice, lime juice, yuzu juice, kabosu juice, sudachi juice and  
shii kuwasa juice, wherein each juice has a citric acid content  
of 3 to 8% by weight, is further added one time or several times  
~~from the middle stage~~in the latter half of the acetic acid  
fermentation ~~to the last stage of the acetic acid fermentation.~~

31. (Amended) The method according to claim 21 wherein  
after the acetic acid fermentation, the fruit vinegar is  
~~sterilized and filtered by~~subjected to ultra filtration.